# Nutrition

**Definition:** Nutrition relates to what a person chooses to eat and to the social, economic, cultural, and other factors that determine those choices. Poor nutrition results from an inadequate or inappropriate dietary intake. A diet inappropriate to one's age, gender, pregnancy status, activity level, or medical condition can have serious adverse health effects.

## Summary

**A 1988 report from the U.S. Surgeon General said, "For the two out of three adult Americans who do not smoke and do not drink excessively, one personal choice seems to influence long-term health prospects more than any other: what we eat."[1]**

**Diet influences the risk of several major chronic diseases, including cancer, cardiovascular disease, osteoporosis, and diabetes mellitus. Inadequate access to nutritious food affects the growth, development and health status of pregnant women, infants, children, and adolescents.**

**The major prerequisites to healthful diets are access to safe and nutritious food and access to accurate nutrition education and information.**

**Nutrition can be improved through education, policies that promote healthful eating practices, and assurance that everyone has access to safe and nutritious food, accurate information, and appropriate nutrition services.**

## Introduction

Poor dietary practices and eating behavior contribute substantially to preventable illness and premature death in the United States. Combined with physical inactivity, they are the second leading cause of preventable mortality in the nation. Nutrition affects health at all stages of life, from fetal development in pregnancy to the health and well-being among the elderly. Dietary factors have been associated with cardiovascular disease (coronary artery disease, stroke, and high blood pressure), cancers (colon, breast, and prostate), osteoporosis, and diabetes mellitus.[2] The impact of undernutrition during pregnancy (an inadequate amount of calories, nutrients, or both) can have long term detrimental consequences on a child's physical and cognitive growth and long term detrimental impacts on the mother's health.

This report examines nutrition in Washington state from five different perspectives:

- Fat intake
- Fruit and vegetable intake
- Overweight prevalence
- Weight gain in pregnancy
- Breastfeeding

The first three relate to the role of diet in the development of chronic disease; the last two address the impact of optimal nutrition on the health, growth potential, and quality of life of mothers and infants.

The national health promotion and disease prevention objectives will be used as a reference to address these five nutritional perspectives.[3]

The *Dietary Guidelines for Americans* recommend that Americans over the age of two eat a variety of foods; maintain healthy weight; choose a diet low in fat, saturated fat, and cholesterol; choose a diet with plenty of vegetables, fruits, and grain products; and use sugars, salt and sodium only in moderation.[4]

## Fat Intake

***National objective:*** Reduce dietary fat intake to an average of 30% of calories or less and average saturated fat intake to less than 10 % of calories among people aged 2 and older.

***Data.*** In Washington the average intake of fat for adults in 1992 was 35% (±3) of calories.[5] This proportion was slightly higher for males (36% ±4) and slightly lower for females (34% ±4). It was slightly higher among younger adults of both genders, compared with older adults.

In the United States, the diets of people aged 2 years and older are composed, on the average, of about 34% of calories from total fat and 12% of calories from saturated fat. These figures have shown modest improvement in recent years. However, only about one-fifth of the population has achieved the goal of a daily average of no more than 30% of calories from fat. A similar

proportion have met the goal of less than 10% of calories from saturated fat.[6]

***Health Effects.*** The percent of calories from saturated and polyunsaturated fat and the amount of cholesterol in the diet are important determinants of the level of plasma cholesterol, a major contributor to heart disease risk. It is estimated on average that a one percent decrease in the intake of saturated fat results in a 2 mg/dl decrease in plasma cholesterol.[7] This in turn can bring about a reduction in heart disease risk. High intake of dietary fat is also associated with an increased risk for developing cancer of the colon, prostate and female breast.

***Interventions.*** Programs that have demonstrated effective community interventions for a decrease in dietary fat include a program from South Carolina which incorporated community nutrition classes, grocery store tours, speakers bureaus, professional education classes, home study courses, and worksite nutrition education programs. This program focused on the impact of low fat diets on serum cholesterol. The intervention community, compared with a control community, had a significant decrease in the intake of dietary fats ( -9% vs. -4%) and an increased awareness of restaurant information (33% vs. 19%).[8]

The Women's Health Trial, a research project of the Fred Hutchinson Cancer Research Center, provided multiple group intervention sessions to women over an 18 month period to reduce fat intake. This program demonstrated not only an initial significant decrease in fat intake of 54% during the intervention period but also a retention of these diet changes at the one year follow up.[9] However, this level of success was demonstrated in a carefully screened group of highly motivated, healthy women who were at increased risk of breast cancer and who were able and willing to devote the time to training and follow-up.

## Fruit and Vegetable Intake

***National objective:*** Increase complex carbohydrate and fiber-containing foods in the diets of people aged 2 and older to an average of 5 or more daily servings for vegetables (including legumes) and fruits, and to an average of 6 or more daily servings for grain products.

***Data.*** Of Washington adults surveyed in 1994, 21% (±2) reported consuming five or more servings of fruits and vegetables daily. This proportion was higher among females (25% ±2) than males (18% ±3) and increased with age from 18% (±5) among 18-24 year olds to 32% (±4) among those age 65 and older. Among individuals with less than high school education, 15% (±4) averaged five daily servings, compared to 24% (±2) of those with some education beyond high school. No time trend or regional data are available.

Nationally, a similar pattern was observed in the 1990 Behavioral Risk Factor Surveillance System (BRFSS) among 23,699 adults in 16 US states. Of the population surveyed, only 20% consumed the recommended 5 or more daily servings. Intake varied somewhat by state but again was lower among the young and the less educated.[10]

***Health Effects.*** Research suggests that an increase in the intake of fruits and vegetables may be a protective factor for the incidence of cancer at many sites, including the mouth, pharynx, larynx, esophagus, lung, stomach, colon, rectum, bladder, and cervix.[11] For a diet high in fruits and vegetables, the magnitude of this effect has been estimated to be a 30-40% decrease in the risk of lung and colon cancer, a 50% decrease for laryngeal cancer, and a 60% decrease in stomach cancer. [12] Consumption of at least five daily servings of fruits and vegetables is expected to reduce an individual's risk of developing cancer at these sites.

Fruits and vegetables, with their low caloric density and high vitamin and mineral content, may improve an individual's energy balance by providing low caloric foods which may substitute for high caloric foods. This may assist in maintaining desirable body weight.

***Interventions.*** Interventions designed to increase the intake of fruits and vegetables are currently being promoted in the national 5 A Day For Better Health Program. The goal of the Washington 5 A Day Program is to increase the consumption of fruits and vegetables from the current 2.5 to 3.5 servings a day to five or more servings a day. The program promotes Washington-grown produce when in season. The consumption of five or more servings of fruits and vegetables a day is promoted as part of the Food Guide Pyramid and the U.S. Dietary Guidelines, and within the context of preventive health issues

(such as cancer, diabetes, and cardiovascular disease). Research is being conducted in select cities, including Seattle, using similar strategies that were previously demonstrated as effective in the South Carolina model for reduction of fat intake.[13] [14]

## Overweight Prevalence

***National objective:*** Increase to at least 50% the proportion of overweight people aged 12 and older who have adopted sound dietary practices combined with regular physical activity to attain an appropriate body weight.

***Data.*** Washington state data on overweight, based on self-report of height and weight, show an increasing trend in overall prevalence, from 21% in 1987 to 25% in 1994. (See technical note.) Overweight prevalence increased with age from 16% in 18-24 year olds to 36% in people 45 to 54 years of age and 32% in people 55 to 64 years of age.

The prevalence of overweight has increased over the last decade for US adults and adolescents. One in three adults and one in five adolescents in the US are overweight.[15] [16] Between 1976-80 and 1988-91, the percentage of the adult population considered to be overweight increased by 8%.[17] Among all ethnic and age subgroups of the population, overweight is on the rise. It is especially prevalent among African American and Mexican-American women, nearly half whom are overweight.

***Health Effects.*** Adult men and women over 140% of ideal weight have a risk of death due to all causes that is twice as high as that for individuals of ideal weight.[18] Obesity was also associated with substantial increases in mortality from cancer of the endometrium, uterine cervix, gall bladder, ovaries, and female breast.[19] Overweight individuals are also more prone to developing hypertension, elevated blood cholesterol, and diabetes, which increase the risk of heart disease and other chronic conditions.

Being overweight also impacts the social and physical health of children and adolescents. In addition, many obese children become obese adolescents and adults. It has been estimated that 40% of obese children at 7 years of age and 70% of obese adolescents become obese as adults.[20]

***Interventions.*** The effectiveness of programs for sustained weight loss for a cross-section of the population has been mixed. Focused programs for short term weight loss have shown some success, but resumption of previous dietary patterns and weight gain have been major limitations. Successful strategies are likely to involve coordinated efforts to reduce fat consumption, increase fruit and vegetable intake, and promote physical activity.

## Weight Gain In Pregnancy

***National objective:*** Increase to at least 85% the proportion of mothers who achieve the minimum recommended weight gain during their pregnancies.

***Data.*** Based on Pregnancy Risk Assessment Monitoring System (PRAMS) data (see Technical Note) in Washington for the years 1993 and 1994, an estimated 43% (±4) of new mothers had an adequate weight gain during pregnancy; 19% (±3) of new mothers had inadequate weight gain and 38% (±4) had excessive weight gain.

A comprehensive review of studies on weight gain during pregnancy, including the National Natality Survey (see technical note), found low or inadequate weight gain to be associated with: African American or Southeast Asian background, very young age (<2 years post-menarche), multiparity, unmarried status, smoking during pregnancy, and low income.[21] Washington studies based on PRAMS have had similar findings and also have found that women with inadequate weight gain are least likely to be Women, Infant, and Children (WIC) program recipients.

Characteristics of women with excessive weight gain have not been well described in the literature or in Washington studies.

***Health Effects.*** National recommendations state that weight gain in pregnancy should be based on pre-pregnancy weight for height. More specifically, weight gain in pregnancy should be highest in thin and tall women and lowest in overweight and short women.

A low pre-pregnant weight has been shown to be associated with an increased incidence of premature births, low birth weight, and increased perinatal mortality. The underweight woman who gains inadequate weight during pregnancy has a 50% chance of delivering a low birth weight infant. In 1993-1994 PRAMS data, a direct, linear relationship was seen between weight gain in pregnancy and infant birth weight. Low birth

weight is the single most important contributor to infant mortality rate in the United States, and is the most serious outcome associated with poor maternal nutrition.[22]

Inadequate pregnancy weight gain can have other deleterious effects on the mother and infant, as well. An inadequate amount of calories and/or nutrients during gestation and early childhood can have long term detrimental effects on a child's physical and cognitive growth.[23] Also, women who are undernourished during pregnancy have higher rates of iron deficiency anemia and increased risk of future poor pregnancy outcomes and eventual osteoporosis.[24]

A high pre-pregnancy weight and excessive weight gain during pregnancy can impact pregnancy outcome by increasing the risk of obstetrical complications (e.g. cesarean section), and by increasing the risk of giving birth to a high birth weight infant and of hyperglycemia in the infant.[25]

***Interventions.*** Prenatal care services that monitor nutritional status and weight gain have been demonstrated to be effective in reducing the rate of inadequate weight gain among women at risk: teens, women 35 years and older, unmarried women, women with less than 12 years education and African American women.[26]

Studies of low income pregnant women receiving prenatal WIC services demonstrated higher birth weights, longer gestational ages, and lower Medicaid costs for mothers and newborns.[27] (See technical notes.) These services include such things as nutrition education, the provision of food vouchers, and improved access to health care.

## Breastfeeding

***National objective:*** Increase to at least 75% the proportion of mothers who breastfeed their babies in the early postpartum period and to at least 50% the proportion who continue breastfeeding until their babies are 5 - 6 months old.

***Data.*** Seventy-one percent (±3) of Washington infants in 1993-94 were breastfed one week or more. However, Washington-specific data on the duration of breast feeding are not available.

Nationally, in-hospital breastfeeding rates increased in the early 1970's to a high of 60% in 1984.[28] For the next four years these rates declined to a low of 52% in 1989. Recent findings show that in-hospital rates are again increasing, but are still lower than the levels reported in the early 1980's. Data for 1994 show in-hospital rates of breastfeeding of 57%.[29] National trends for duration of breastfeeding follow trends for in-hospital breastfeeding. The percent of women breastfeeding at six months postpartum peaked in the early 1980's at 22-23%, declined to a low of 17% by 1990, and has since slowly increased to 20% in 1994.[30]

Several demographic factors are associated with lower breastfeeding rates in the US. These include lower socioeconomic status, young maternal age, low educational attainment level, unmarried status, and being African American.[31] Initial findings from Washington PRAMS are similar to national findings; however, data from racial/ethnic groups are limited. National data from 1994 show some improvement in breastfeeding rates among low income and African American women.

***Health Effects.*** Breastfeeding provides many benefits to young children. Breastfed infants are half as likely to have any illness during the first year of life. Exclusive breastfeeding for four months or more has been shown to dramatically reduce the occurrence of otitis media, and has been associated with a lower incidence of recurrent wheezing, urinary tract infection, insulin-dependent diabetes, meningitis, and sudden infant death syndrome (SIDS).[32] [33] The health care costs due to inadequate breastfeeding of infants in the United States have been estimated at between two and four billion dollars a year.[34]

Breastfeeding has been shown to be associated with improved cognitive development even when controlling for such confounding factors as socioeconomic status, gender, parental education, drug and alcohol use and birth weight. The mechanisms for this relationship are unknown; however, the consistency of the findings from different studies in different populations, among different ages of children at testing, and controlling for confounding variables, point to the possibility of a causal linkage.[35] [36]

***Interventions.*** Virtually all professional health organizations promote breastfeeding as the optimal way to feed infants.[37] Early results from nutrition education programs designed to utilize peers to promote and support the incidence and duration of breastfeeding appear promising.[38] However,

further research is needed to identify factors that influence the decision of mothers to both initiate and continue breastfeeding, especially among adolescents, mothers with limited education, African American, Hispanic, and other women of color.[39]

## Conclusion

Food and nutrition needs are affected by many factors including genetics, stages of growth and development, activity, medical conditions, environment, economics, family structure, culture, and access to community-based food and nutrition services. Because dietary practices that are learned at a young age may be carried into adulthood, establishing healthy dietary patterns at an early age is important. Key elements of a primary prevention strategy against obesity and chronic diseases are provision of proper nutrition that ensures appropriate weight gain in pregnancy, growth and development of infants children and adolescents and the maintenance of a healthy diet and healthy weight throughout a person's lifetime.

**See related sections on Coronary Heart Disease, High Blood Cholesterol, All Cancer, Colorectal Cancer, Breast Cancer, Diabetes, Prenatal Care, Infant Mortality, and Low Birth Weight.**

### *Data Sources*

State fat intake data: Unpublished data. Fred Hutchinson Cancer Research Center - Surveillance Investigation Section: Year 3 data (1992), Washington State Telephone Survey. Personal Communication Alan Kristal, Ph.D.

State Fruit and vegetable data: Behavioral Risk Factor Surveillance System, Washington State Department of Health, Center for Health Statistics.

State Overweight data: Behavioral Risk Factor Surveillance System, Washington State Department of Health, Center for Health Statistics.

State MCH data: The Pregnancy Risk Assessment Monitoring System (PRAMS), Washington State Department of Health, Community and Family Health. See technical note.

In hospital breastfeeding data: The Ross Mothers National Survey, Ross Products Division, Abbot Laboratories. See technical note.

### *Technical Notes*

Overweight, as defined in the NHANES program, is a body mass index (weight in kilograms/ height in meters, squared), > 27.8 for men and > 27.3 for women (11).

The National Natality Survey is a large probability sample of all live births to U.S. women.

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a combined effort of the Centers for Disease Control and Prevention and state health departments. PRAMS is a ongoing population-based surveillance system designed to supplement vital records data and to generate state-specific data for planning and assessing prenatal health programs. PRAMS collects data from a stratified random sample of new mothers (3,000 per year), two to six months after delivery, by postal survey with telephone follow-up for non-responders.

The Ross Mothers Survey is periodically mailed to new mothers at the time their babies are six months of age. Questionnaires are mailed to a probability sample that represents over 80% of all national births with a response rate in the range of 50%. Conducted by the Ross Products division of Abbot Laboratories, this survey is currently the only source of national data on the incidence and duration of breastfeeding.

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) provides nutrition services and personal health services to 124,000 low income pregnant, breastfeeding and postpartum women, infants and children to age 5 in Washington State. Because WIC is not an entitlement program, only 64% of the potentially eligible clients in Washington are able to receive WIC services. The Washington WIC program is provided through contracts with 70 local agencies in 359 sites in the state. Funding sources for WIC are federal, state and local. WIC currently serves 44% of the birth cohort in the United States.

### *References*

Sharbaugh, Carolyn O (Ed) Call to Action: Better Nutrition for Mothers, Children and Families. Washington, D.C. National Center for Education in Maternal and Child Health, 1991.

National Research Council (U.S.). Committee on Diet and Health: Implications for Reducing Chronic Disease, National Academy of Sciences, 1989.

### *Endnotes*

[1] Department of Health and Human Services /U.S. Department of Agriculture. The Surgeons General's Report on Nutrition and Health. USGPO, #88-50210, 1988.

[2] McGinnis, M, and Foege, W.H. "Actual Causes of Death in the United States," JAMA, 270(18):2207, 1993.

[3] Department of Health and Human Services. (1990). Healthy People 2000: National Health Promotion and Disease Prevention Objectives. Washington DC: Government Printing Office.

[4] Department of Health and Human Services/U.S. Department of Agriculture. Dietary Guidelines for Americans. 3rd Ed. USGPO, #273-930, 1990.

[5] Personal Communication, Kristal, A: Fred Hutchinson Cancer Research Center.

[6] Lewis, CJ, et al. Healthy People 2000: Report on the 1994 Nutrition Progress Review. Nutrition Today 29:6-14, 1994.

[7] McNamara, DJ. Cardiovascular Disease in Modern Nutrition in Health and Disease. Eds. Shils, MD., Olson, JA., Shike, M. Lea & Febiger, Philadelphia 1994.

[8] Croft JB, Temple SP, Lankenau B, Heath GW, Macera CA, Eaker ED, Wheeler FC. Community intervention and trends in dietary fat consumption among African American and white adults. J Am Dietetic Assoc 1994;94;1284-90.

[9] Kristal AR, White E, Shattuck AL, Curry S, Anderson GL, Fowler A, Urban N. Long-term maintenance of a low-fat diet: durability of fat-related dietary habits in the Women's Health Trial. J Am Dietetic Assoc 1992;92:553-9.

[10] Serdula, M.K., et al. "Fruit and Vegetable intake among adults in 16 states: results of a brief telephone survey" Am J Public Health. 85:236-239, 1995.

[11] Ziegler RG, Subar AF, Craft NE, Ursin G, Patterson BH, Graubard BI. Does β-carotene explain why reduced cancer risk is associated with vegetable and fruit intake? Can Research (Suppl) 1992;52:2060S-6S.

[12] Block G. Vitamin C and cancer prevention: the epidemiologic evidence. Am J Clin Nutr 1991;53:270S-82S.

[13] Havas S, Heimendinger J, Reynolds K, Baranowski T, Nicklas TA, Bishop D, Buller D, Sorensen G, Beresford SA, Cowan A, Damron D. Five a day for better health: a new research initiative. J Am Dietetic Assoc 1994;94:32-6.

[14] Havas S, Heimendinger J, Reynolds K, Baranowski T, Nicklas TA, Bishop D, Buller D, Sorensen G, Beresford SA, Cowan A, Damron D. Five a day for better health: a new research initiative. J Am Dietetic Assoc 1994;94:32-6.

[15] Kuczmarski, R.J. et al. Increasing prevalence of overweight among U.S. adults: the National Health and Nutrition Examination Surveys. 1960 to 1991. JAMA 272(20): 205-11, 1994.

[16] Prevalence of overweight among adolescents, United States, 1988-91. MMWR 43:818-21, 1994.

[17] Kuczmarski, R.J. et al. Increasing prevalence of overweight among U.S. adults: the National Health and Nutrition Examination Surveys. 1960 to 1991. JAMA 272(20): 205-11, 1994.

[18] Garfinkel, L. Overweight and mortality. Cancer 58:1826-1829, 1986.

[19] Prevalence of overweight among adolescents, United States, 1988-91. MMWR 43:818-21, 1994.

[20] Kalata G. Obese children: a growing problem. Science. 232: 20. 1986.

[21] Institute of Medicine/National Academy of Sciences. Nutrition During Pregnancy. National Academy Press, 1990.

[22] Ibid.

[23] Ibid.

[24] Ibid.

[25] Ibid.

[26] Institute of Medicine/National Academy of Sciences. Nutrition During Pregnancy. National Academy Press, 1990.

[27] Mathematica Policy Research, Inc. "The Savings in Medicaid Costs for Newborns and Their Mothers from Prenatal Participation in WIC Program" Vol. 1 October 1, 1990.USDA-FAS.

[28] Ross Laboratories Mothers Survey. Communications from Ross Laboratories, 1995.

[29] Ibid.

[30] Ross Laboratories Mothers Survey. Communications from Ross Laboratories, 1995.

[31] Institute of Medicine, National Academy of Sciences. Nutrition During Lactation. National Academy Press, Washington, D.C. 1991.

[32] American Academy of Pediatrics Work Group on Cow's Milk Protein and Diabetes Mellitus. Infant feeding practices and their possible relationship to the etiology of diabetes mellitus. Pediatrics. 94:752-4. 1994.

[33] Ford, R.P., et al. Breastfeeding and the risk of sudden infant death syndrome. International Journal of Epidemiology.

[34] Heiser, B. "Affordable health care begins with breastfeeding" Breastfeeding Abstracts, 14(2): 11. November 1994.

[35] Heiser, B. "Affordable health care begins with breastfeeding" Breastfeeding Abstracts, 14(2): 11. November 1994.

[36] Bauer, G., L.S. Ewald, et. al. "Breastfeeding and Cognitive Development of three-year-old-children," Psychological Reports, 1991

[37] Lawrence, Ruth: Breastfeeding: A Guide for the Medical Profession, 1989.

[38] Gavin, M.A. et al: Lactation Counseling and support: impact on incidence of breastfeeding in a local WIC Program. 1992 (unpublished)

[39] Institute of Medicine, National Academy of Sciences. Nutrition During Lactation. National Academy Press, Washington, D.C. 1991.